



Technology Demonstration Summary Sheet

Rosie Mobile Robot Work System

THE NEED

During the decontamination and decommissioning (D&D) process, the handling of highly radioactive materials, the deployment of tools and sensors and the dismantlement of components built from many different materials can be a long, labor intensive process that has the potential for high exposure rates, heat stress and injury to personnel.

THE TECHNOLOGY

The Rosie Mobile Robot Work System for D&D (Rosie) is a product supplied by RedZone Robotics, Inc.

The system includes a tethered robot, a power distribution unit (PDU) and a control console for robot operation. The mobile base, (locomotor), supports a telescoping boom, (heavy manipulator). The locomotor is a hydraulically-powered (3000 psi) base with onboard tether management and provides a mobile platform for the system. The heavy manipulator provides a four degrees-of-freedom, moderate payload capability, long reach mechanism capable of carrying various tools and equipment. It can support one manipulator arm or a large demolition hammer and/or lift a payload up to 2000 lbs. throughout its approximate 25 foot range of motion. Rosie is a teleoperated system that allows a single operator to maneuver and work effectively from up to 500 feet away without direct line-of-sight.

Prior to the start of this demonstration, a demolition jackhammer was mounted onto the heavy manipulator and tested. Rosie currently has a Predator manipulator arm attached to a mounting plated bolted onto the end of the heavy manipulator. The arm was built by Kraft TeleRobotics, Inc. and is capable of lifting 200 lbs. Modified gripper paddles were designed and fitted onto the Predator arm for graphite block removal.

THE DEMONSTRATION

The demonstration was performed at the Argonne National Laboratory (ANL) CP-5 Research Reactor from June through September 1997. Rosie's ability to remotely remove graphite via the Predator arm, move radioactive materials from the reactor assembly to a staging area using a specially designed steel transfer can, and position video cameras in strategic locations to support reactor dismantlement efforts was demonstrated.



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THE RESULTS

Rosie, using the Predator arm, removed approximately 3000 lbs. of graphite blocks. Additionally, using the steel transfer can, Rosie safely off-loaded a total of 5500 lbs. of radioactive materials including graphite blocks, lead sheeting, boral, and aluminum plate from the top of the reactor assembly with radiation levels up to 1.2 R/hr. Lastly, with the high reach capability of the heavy manipulator-mounted cameras, Rosie was able to provide useful, supplemental viewpoints to the DAWP operators when unique camera angles were needed to support reactor tank and graphite removal operations.

Rosie was typically controlled by one operator working in an adjacent control room. In this way, personnel could maintain a safe distance from the radiation in the CP-5 reactor. Rosie was operating in a radiation field ranging from 0.05 to 2.0 R/hr for the duration of this work. By using this remote system, a significant amount of personnel exposure was avoided.

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